(3) *Comparing calculated and interpolated emission values.* The measured brake specific gaseous emissions of the control point Z (X_Z) must be less than or equal to the interpolated value (E_Z).

[65 FR 59958, Oct. 6, 2000, as amended at 66 FR 5188, Jan. 18, 2001; 70 FR 40439, July 13, 2005; 71 FR 51487, Aug. 30, 2006; 73 FR 37192, June 30, 2008]

§ 86.1362–2007 Steady-state testing with a ramped-modal cycle.

This section describes how to test engines under steady-state conditions. Manufacturers may alternatively use the procedures specified in § 86.1363–2007 through the 2009 model year.

(a) Start sampling at the beginning of the first mode and continue sampling until the end of the last mode. Calculate emissions as described in 40 CFR 1065.650 and cycle statistics as described in 40 CFR 1065.514.

(b) Measure emissions by testing the engine on a dynamometer with the following ramped-modal duty cycle to determine whether it meets the applicable steady-state emission standards:

RMC mode	Time in mode (seconds)	Engine speed [1,2]	Torque (percent) [2,3]
1a Steady-state	170	Warm Idle	0
1b Transition	20	Linear Transition	Linear Transition
2a Steady-state	170	A	100
2b Transition	20	A	Linear Transition
3a Steady-state	102	A	25
3b Transition	20	A	Linear Transition
4a Steady-state	100	A	75
4b Transition	20	A	Linear Transition
5a Steady-state	103	A	50
5b Transition	20	Linear Transition	Linear Transition
6a Steady-state	194	B	100
6b Transition	20	B	Linear Transition
7a Steady-state	219	B	25
7b Transition	20	B	Linear Transition
8a Steady-state	220	B	75
8b Transition	20	B	Linear Transition
9a Steady-state	219	B	50
9b Transition	20	Linear Transition	Linear Transition
10a Steady-state	171	C	100
10b Transition	20	C	Linear Transition
11a Steady-state	102	C	25
11b Transition	20	C	Linear Transition
12a Steady-state	100	C	75
12b Transition	20	C	Linear Transition
13a Steady-state	102	C	50
13b Transition	20	Linear Transition	Linear Transition
14 Steady-state	168	Warm Idle	0

[1] Speed terms are defined in 40 CFR part 1065.
[2] Advance from one mode to the next within a 20-second transition phase. During the transition phase, command a linear progression from the speed or torque setting of the current mode to the speed or torque setting of the next mode.
[3] The percent torque is relative to maximum torque at the commanded engine speed.

(c) During idle mode, operate the engine with the following parameters:

(1) Hold the speed within your specifications.

(2) Set the engine to operate at its minimum fueling rate.

(3) Keep engine torque under 5 percent of maximum test torque.

(d) [Reserved]

(e) See 40 CFR part 1065 for detailed specifications of tolerances and calculations.

(f) Perform the ramped-modal test with a warmed-up engine. If the ramped-modal test follows directly after testing over the Federal Test Procedure, consider the engine warm. Otherwise, operate the engine to warm it up as described in 40 CFR part 1065, subpart F.

[70 FR 40439, July 13, 2005, as amended 73 FR 37193, June 30, 2008]

§ 86.1362–2010 Steady-state testing with a ramped-modal cycle.

This section describes how to test engines under steady-state conditions. For model years through 2009, manufacturers may use the mode order described in this section or in § 86.1362–

2007. Starting in model year 2010 manufacturers must use the mode order described in this section with the following exception: for model year 2010, manufacturers may continue to use the cycle specified in § 86.1362–2007 as long as it does not adversely affect the ability to demonstrate compliance with the standards.

(a) Start sampling at the beginning of the first mode and continue sampling until the end of the last mode. Calculate emissions as described in 40 CFR 1065.650 and cycle statistics as described in 40 CFR 1065.514.

(b) Measure emissions by testing the engine on a dynamometer with the following ramped-modal duty cycle to determine whether it meets the applicable steady-state emission standards:

RMC mode	Time in mode (seconds)	Engine speed [1] [2]	Torque (percent) [2] [3]
1a Steady-state	170	Warm Idle	0
1b Transition	20	Linear Transition	Linear Transition.
2a Steady-state	173	A	100
2b Transition	20	Linear Transition	Linear Transition.
3a Steady-state	219	B	50
3b Transition	20	B	Linear Transition.
4a Steady-state	217	B	75
4b Transition	20	Linear Transition	Linear Transition.
5a Steady-state	103	A	50
5b Transition	20	A	Linear Transition.
6a Steady-state	100	A	75
6b Transition	20	A	Linear Transition.
7a Steady-state	103	A	25
7b Transition	20	Linear Transition	Linear Transition.
8a Steady-state	194	B	100
8b Transition	20	B	Linear Transition.
9a Steady-state	218	B	25
9b Transition	20	Linear Transition	Linear Transition.
10a Steady-state	171	C	100
10b Transition	20	C	Linear Transition.
11a Steady-state	102	C	25
11b Transition	20	C	Linear Transition.
12a Steady-state	100	C	75
12b Transition	20	C	Linear Transition.
13a Steady-state	102	C	50
13b Transition	20	Linear Transition	Linear Transition.
14 Steady-state	168	Warm Idle	0

[1] Speed terms are defined in 40 CFR part 1065.
[2] Advance from one mode to the next within a 20-second transition phase. During the transition phase, command a linear progression from the speed or torque setting of the current mode to the speed or torque setting of the next mode.
[3] The percent torque is relative to maximum torque at the commanded engine speed.

(c) During idle mode, operate the engine at its warm idle as described in 40 CFR part 1065.

(d) See 40 CFR part 1065 for detailed specifications of tolerances and calculations.

(e) Perform the ramped-modal test with a warmed-up engine. If the ramped-modal test follows directly after testing over the Federal Test Procedure, consider the engine warm. Otherwise, operate the engine to warm it up as described in 40 CFR part 1065, subpart F.

[73 FR 37193, June 30, 2008]

§ 86.1363–2007 Steady-state testing with a discrete-mode cycle.

This section describes an alternate procedure for steady-state testing that manufacturers may use through the 2009 model year.

(a) Use the following 13-mode cycle in dynamometer operation on the test engine:

Mode No.	Engine speed [1]	Percent load [2]	Weighting factors	Mode length (minutes) [3]
1	Warm Idle		0.15	4
2	A	100	0.08	2
3	B	50	0.10	2